

WHAT IS CLAIMED IS:

1. Apparatus for the printing and binding a perfect bound book, the latter comprising a book block having of a plurality of text pages with one edge of said book block constituting a spine, said book having a paper cover adhesively secured to said spine, said apparatus comprising a text page printer for printing said text pages  
5 constituting said book block of a selected book to be printed , a cover printer for printing said cover corresponding to said book being printed , a tray for receiving said text pages printed by said text page printer and accumulating said text pages so as to form said book block, a cover transfer conveyor for receiving said cover printed by said cover printer and for conveying said cover to a binding station, a carriage movable along a workpath from a first station at which said carriage is in position to receive said book block from said tray to an adhesive application station at which an adhesive is applied to the spine of said book block, and to said binding station, the later having a clamp for clamping said cover to said book block proximate said spine so as to effect the adhesive binding of said cover to said book block.

2. Apparatus as set forth in Claim 1 further comprising a second text page printer for printing the text pages of a second book to be printed and bound , said second text page printer being located along said workpath at a location separate from said first text page printer, said apparatus further having a second tray for receiving said  
5 text pages printed by said second printer and for accumulating said text pages to form a second book block for said second book, said cover printer printing a cover corresponding to said second book and said cover conveyor conveying said second cover to said binding station after binding of said first book is completed at said binding

station, said carriage being movable to a position along said workpath for receiving said  
10 second book block from said second tray and thence being movable along said work  
path to said adhesive application station for having said adhesive applied to said spine  
of said second book block and thence to said binding station for being bound to said  
second cover.

3. Apparatus for printing books and for perfect binding said books, each said  
book to be printed and bound having a book block comprising a plurality of text pages  
and a cover corresponding to said book being printed, one edge of said book block  
constituting a spine, said apparatus being characterized by:

a computer control system for controlling operation of said apparatus, said  
computer control system receiving information relating to a first book to be printed and  
bound, said information including the size of the book and the number of pages in said  
book block, information corresponding to the text pages to be printed and to the cover to  
be printed, and information relating to excess margins of the bound book that must be  
10 trimmed to form a book of predetermined finished size;

a text page printer for printing said text pages of the book being printed and for  
accumulating said text pages so as to constitute said book block for said book being  
printed;

a cover printer for printing said cover corresponding to said book being printed;  
15 said computer control system initiating printing of said text pages by said text  
page printer and initiating printing of said cover by said cover printer;

a cover transfer conveyor for receiving said cover printed by said cover printer  
and for conveying said cover to a binding station,

a carriage movable along a work path, said carriage receiving said book block,  
20 said carriage establishing a reference position for said book block known to said  
computer control system;

said carriage being movable along a work path, said work path having an  
adhesive application station, a binding station, and a trimming station located  
therealong;

25 upon the completion of the printing of said book block, said computer control  
system initiating transfer of said book block into said carriage and movement said  
carriage along said work path to said adhesive application station for the application of  
adhesive so as to be disposed between the spine of said book block and a center  
portion of its respective cover upon binding of said book, said computer control system  
30 positioning said book block at said binding station with respect to said cover positioned  
at said binding station such that said book block is substantially centered with respect to  
said center portion of said cover and such that said book block is substantially centered  
heightwise of said cover;

said binding station having a clamp engageable with said cover proximate said  
35 spine for clamping said cover around said spine of said book;

said computer control system effecting clamping of said cover to said book block  
so that said adhesive adheres said center portion of said cover to said spine of said  
book block; and

after binding of said cover to said book block so as to form a perfect bound book,  
40 said computer control system further initiating movement of said carriage along said  
workpath for conveying said bound book to said trimming station, the latter effecting

operation of a selectively actuable trimming blade at said trimming station for trimming said excess margins of said bound book along one or more edges thereof so as to form a perfect bound book of a predetermined finished size.

4. Apparatus for printing a plurality of books one after the other, for perfect binding each of said books, and for trimming each of said books to a predetermined finished size, each said book to be printed and bound having a book block comprising a plurality of text pages and a cover corresponding to said book being printed, one edge of book block constituting said spine of said book block, said apparatus being characterized by:

a computer control system, said computer control system receiving information relating to each of the books to be printed, bound, and trimmed, said information relating to a first book including the finished size of the first book, the number of pages in said first book, information corresponding to the text pages to be printed and to the cover to be printed for said first book, and information regarding excess margins that must be trimmed from said first book as initially printed and bound so as to be of a predetermined finished size, said computer control system for the receiving information relating to a second book including the finished size of the second book, the number of  
15 pages in said second book, information corresponding to the text pages to be printed and to the second cover to be printed for said second book, and information regarding excess margins that must be trimmed from said second book as initially printed and bound so as to be of a predetermined finished size;

a first text page printer for printing said text pages for said first book;

20 a cover printer;

a second text page printer for printing said text pages for second book;

a first tray receiving said text pages printed by said first text page printer, said text pages being accumulated on said first tray for constituting said first book block;

a second tray receiving said text pages printed by said second text page printer, said text pages being accumulated on said second tray for constituting said second book block;

a cover conveyor for receiving said covers printed by said cover printer and for conveying said covers to a binding station;

a carriage movable along a work path, the latter having a first station at which said carriage receives said first book block, an adhesive application station at which an adhesive is applied so as to be disposed between said spine and said cover, a binding station at which said book block carried by said carriage is bound to a respective cover positioned at said binding station, the latter having a clamp for clamping a cover to a book block proximate the spine of the book block, a trimming station at which excess margins of the book bound at said binding station are trimmed from along one or more edges of said book, and a second station at which said carriage receives said second book block;

said computer control system initiating printing of said text pages for said first book block by said first text page printer and initiating printing of said first cover by said cover printer;

said computer control system initiating printing of said text pages for said second book block by said second text page printer:

upon the completion of the printing of said text pages for said first book block by  
said first text page printer, said computer control system initiating the transfer of said  
45 first book block from said first tray into said carriage;

said computer control system effecting the positioning of said first book block to a  
known position within said carriage;

upon the completion of the printing of said first cover by said cover printer, said  
computer control system effecting conveying of said first cover from said cover printer to  
50 said binding station with a center portion of said first cover positioned at said binding  
station so as to be in register with the spine of said first book block when the latter is  
positioned at said binding station;

said computer control system effecting the printing of said second cover for said  
second book after said first cover has been printed;

said computer control system further initiating movement of said carriage along  
said work path past said adhesive application station where a suitable adhesive is  
55 applied so as to be between said spine of said first book block and said first cover upon  
binding said first book;

said computer control system effecting stopping said carriage at said binding  
60 station such that said spine of said first book block is substantially centered with respect  
to said first cover and such that said first cover is clamped to first book block proximate  
the spine thereby to form a first bound book;

said computer control system further effecting the transport of said bound first  
book to said trimming station and effecting the release of said first bound first book to  
65 said trimming station, said first bound first book having said excess margins known to

said computer control system, the latter effecting operation of a selectively actuable trimming blade at said trimming station for trimming said excess margins along one or more edges of said first bound book thereby to form said first book of said predetermined finished size;

70 upon the release of said first bound book to said trimming station, said computer control system effecting movement of said carriage to said second position;

said computer control system initiating the transfer of said second book block from said second tray to said carriage;

said computer control system effecting the positioning of said second book block in a known position with respect to said carriage;

said computer control system effecting the transfer of said second cover from said cover printer to said binding station;

said computer control system effecting movement of said carriage along said work path from said second position to said adhesive application station where a suitable adhesive is applied so as to be between said spine of said second book block and said second cover upon binding of said second book;

said computer control system effecting stopping said carriage at said binding station such that said spine of said second book block is substantially centered with respect to said second cover and effecting clamping of said second cover to said second book block proximate the spine thereof thereby to form a second bound book; and

said computer control system further effecting the transport of said bound second book to said trimming station and effecting the release of said second bound book to

said trimming station, said second bound book having said excess margins known to  
90 said computer control system, the latter effecting operation of said trimming blade for  
trimming said excess margins along one or more edges of said second bound book  
thereby to form a second book of said finished predetermined size.

5. An book printing and binding apparatus, said book having a plurality of  
text pages constituting a book block and a paper cover, said apparatus comprising:

a book printing station that prints said text pages of a book and ejects text pages;

a carriage operatively connected with the book printing station to receive the text  
pages ejected from the book printing station so as to form said book block, said carriage  
holding said book block with one edge of said book block constituting a spine, said book  
block being positioned within the carriage in a known position;

an adhesive station operatively associated with the carriage to apply an adhesive  
to the spine of the book block;

a cover printing station that prints said cover for said book being printed ;

a binding station operatively connected with said cover print station to receive  
said cover;

said binding station being operatively connected with said carriage such that as  
said carriage conveys said book block with said adhesive applied to said spine into said  
15 binding station, said book block is stopped so as to be substantially centered with  
respect to said cover; and

said binding station further including a clamp engageable with said cover and  
with said book block proximate said spine for clamping said cover to said book block  
such that said adhesive binds said cover to said book block along said spine thereby to



20 form a bound book.

6. An book printing and binding apparatus as set forth in Claim 5 further comprising a milling station operatively associated with the carriage so as to roughen the spine of said book block prior to the adhesive station applying the adhesive to said spine.

7. An book printing and binding apparatus as set forth in Claim 5 further comprising:

a conveyor extending from said book printing station to said adhesive application station and to said binding station, carriage being operatively connected with the conveyor to be conveyed by the conveyor from said book printing station to said adhesive station and to said binding station.

8. An book printing and binding apparatus as set forth in Claim 5 wherein said clamp at said binding station is movable between first and second positions wherein the first position the clamp is displaced from the book block from the cover, and in the second position the clamp is in clamping engagement with said cover proximate said spine so as to forcibly clamp said cover to said book block.

9. An book printing and binding apparatus as set forth in Claim 5 wherein said cover printing station includes a color cover printer that prints a color cover for the book and ejects said cover, said cover printing station further including a cover transfer mechanism extending between said cover printer and the binding station, the cover transfer mechanism being operable to receive the printed cover ejected from the cover printer and to transfer the cover to the binding station.

10. An book printing and binding apparatus as set forth in Claim 9 wherein said cover transfer mechanism positions said cover at said binding station with a central portion of said cover in register with the spine of a book block carried by said carriage to be bound to said cover.

11. An book printing and binding apparatus as set forth in Claim 5 further having a trimming station having a nest that receives and holds said bound book, said book being delivered to said nest by said carriage such that the bound book is accurately positioned within said nest in a known position, said trimming station having a shearing mechanism, the nest and the shearing mechanism being movable relative to one another enabling the shearing mechanism to shear predetermined amounts of the book block and cover along one or more edges thereof so as to form a finished book of predetermined dimensions.

12. An book printing and binding apparatus as set forth in Claim 11 wherein said nest is rotatable relative to said shearing mechanism to present more than one edge of both the book block and cover to the shearing mechanism for shearing.

13. An book printing and binding apparatus as set forth in Claim 5 wherein said carriage has a bottom opening such that a book block carried vertically by said carriage has its spine exposed from below such that as the carriage carries the book block spine over the adhesive station adhesive may be applied to said spine.

14. An book printing and binding apparatus as set forth in Claim 13 wherein with said spine exposed through said bottom opening in said carriage, with the book block positioned at said binding station, said spine is in position to be adhesively bound

to said center portion of said cover positioned at said binding station.

15. An book printing and binding apparatus as set forth in Claim 5, further comprising:

a second book printing station that prints text pages of a second book and ejects said text pages of said second book

5 said carriage being operatively associated with to said second book printing station to receive the text pages ejected from said second book printing station so as to form a book block for a second book, said carriage holding said book block for said second book with one edge of this last-said book block constituting its spine;

said carriage conveying said book block for said second book to said adhesive application station for having adhesive applied to its spine, and thence to said binding station;

said cover printing station printing a cover for said second book and delivering this last said cover to said binding station;

15 said carriage positioning said book block for said second book at said binding station with its spine in position to be bound to said cover;

said binding station clamp being operable to clamp said cover to said book block thereby to form said second book.

16. An book printing and binding apparatus as set forth in Claim 15 wherein second book printing station is separate from the first book printing station.

17. An book printing and binding apparatus as set forth in Claim 16 wherein said the first book printing station and the second book printing station are positioned on

opposite sides of the adhesive station and the binding station.

18. An book printing and binding apparatus as set forth in Claim 5 further comprising a transfer mechanism positioned between the book printing station and the carriage to receive said text pages printed by said printing station and to form said book block for said first book, said transfer mechanism being operable to transfer said book  
5 block to said carriage.

19. An book printing and binding apparatus as set forth in Claim 18 wherein said transfer mechanism has a tray that receives said text pages ejected from the book printing station and arranges said text pages so as to form said book block for said first book.

20. An book printing and binding apparatus as set forth in Claim 19 wherein with said carriage in position to receive said book block, said tray being movable from a receiving position in which is receives said pages ejected from said printing station and a delivery position in which said tray delivers said book block to said carriage.

21. An book printing and binding apparatus as set forth in Claim 20 further having a vibrating mechanism mounted on said the tray for vibrating the tray and said text pages received thereon so as to arrange said pages into said book block.

22. An book printing and binding apparatus as set forth in Claim 20 further comprising a clamp mechanism on the tray movable between open and a closed position where in the closed position the clamp holds the book block on the tray and in the open position the clamp releases the book block to be deposited in the carriage.

23. An book printing and binding apparatus as set forth in Claim 5, further comprising a jogging station operatively associated with the carriage and with the book block held in the carriage, the jogging station having a vibrating mechanism to vibrate the book block and thereby align the book block held in the carriage.

24. An book printing and binding apparatus as set forth in Claim 23 wherein the vibrating mechanism is supported in an angled orientation such that the vibrating mechanism exerts both horizontal and vertical vibrating force components on the book block held in the carriage so as to aid in forming said book block.

25. Apparatus for the on demand printing and binding a perfect bound book, the latter comprising a book block having of a plurality of text pages with one edge of said book block constituting a spine, said book having a paper cover adhesively secured to said spine, said apparatus being characterized by:

a first text page printer for printing said text pages constituting said book block of a book to be printed on demand, a cover printer for printing a cover corresponding to said book being printed, means for receiving said text pages printed by said first text page printer and for accumulating said text pages so as to form said book block, a cover transfer conveyor for receiving said cover printed by said cover printer and for conveying said cover to a binding station, a carriage movable along a workpath from a first station at which said carriage is in position to receive said book block from said receiving means to an adhesive application station at which an adhesive is applied so as to be disposed between to the spine of said book block and said cover upon binding of the cover to said book block, said binding station having a clamp for clamping said

15 cover to said book block proximate said spine so as to effect the adhesive binding of  
said cover to said book block.

26. Apparatus as set forth in Claim 25 further comprising a second text page  
printer for printing the text pages of a second book to be printed and bound on demand,  
said second text page printer being located along said workpath at a location separate  
from said first text page printer, said apparatus further having a second means for  
5 receiving said text pages printed by said second text page printer and for accumulating  
said text pages to form a second book block for said second book, said cover printer  
printing a cover corresponding to said second book, said cover transfer conveyor  
conveying said second cover to said binding station after binding of said first book is  
completed at said binding station, said carriage being movable to a position along said  
10 workpath for receiving said second book block from said second receiving means and  
said carriage thence being movable along said work path to said adhesive application  
station and thence to said binding station for being bound to said second cover.

27. Apparatus as set forth in Claim 25 further comprising a trimming station,  
the latter having a trimming blade for trimming said bound book to a predetermined  
finished size.

28. Apparatus as set forth in Claims 26 further comprising a trimming station,  
the latter having a trimming blade for trimming said bound book to a predetermined  
finished size.

29. Apparatus as set forth in Claim 27 wherein said carriage conveys said book block with said cover bound thereto from said binding station to said trimming station.

30. Apparatus as set forth in Claim 29 further comprising a computer control system for controlling operation of said apparatus, said computer control system receiving information relating to said book to be printed and bound including the size of the book, the number of pages in the book, and the excess margins of the bound book that must be trimmed to form a book of said predetermined finished size, said computer control system effecting operation of said first text page printer and of said cover printer to print the text pages and the cover of a first book to be printed on demand, effecting operation of said first receiving means so as to transfer the text pages constituting said book block to said carriage, effecting the transfer of the cover for such first book to the binding station, and effecting movement of the carriage to said adhesive application, binding, and trimming stations.

31. Apparatus as set forth in Claim 30 wherein said computer control system effects the printing of the text pages of a second book on said second text page printer while a first book is being printed and bound, said computer control system further effecting said cover printer to print a second cover for said second book after the cover for the first book has been transferred to said binding station, said computer control system further effecting the transfer of said second book block from said second receiving means to said carriage after the first book has been transferred to said trimming station.

32. Apparatus as set forth in Claim 31 wherein after the book block for said second book has been transferred to said carriage, said computer control system effecting movement of said carriage to said adhesive application station for applying adhesive so as to be disposed between said spine of said second book block and its  
5 respective cover upon binding, to said binding station for binding of the cover for said second book to said second book block, and to said trimming station for trimming of said second book to said predetermined finished dimensions.

33. Apparatus as set forth in Claim 32 wherein said first and second books may be of different sizes and thickness from one another.

34. A method of manufacturing a plurality of print perfect books wherein each book manufactured may be, within a limited range, of a different size and have a widely varying number of pages, each book comprising a plurality of text pages constituting a book block and a paper cover wrapped around the front, back and one edge of said book block, said one edge constituting a spine, said method comprising the steps of:

commanding a first text page printer to print the text pages constituting a book block for a first book to be printed;

accumulating said text pages to form said book block for said first book;

transferring said book block for said first book to a carriage;

10 positioning said book block within said carriage in a known position;

moving said carriage along a work path, the later having an adhesive application station, a binding station, and a trimming station therealong;



at said adhesive application station, applying an adhesive so as to be disposed between said spine of said book block and its respective cover upon binding of the  
15 book;

printing a cover for said first book in a cover printer;

conveying said cover for said first book from said cover printer to said binding station and positioning said cover at said binding station so as to be substantially in register with said spine of said first book block when the latter is positioned at said  
20 binding station;

moving said carriage to said binding station and stopping said carriage at said binding station with the spine of said book block for said first book substantially in register with said cover;

at said binding station, clamping said cover to said book block for said first book proximate said spine so as to adhesively bind said cover to said book block thereby forming a bound first book;

moving said bound first book from said binding station to said trimming station and transferring said bound first book to said trimming station;

determining the amount of any excess margins along one or more edges of said  
30 bound book; and

effecting operation of a trimming blade at said trimming station so as to trim said excess margins from said bound first book thereby to form a first book of a predetermined finished size.

35. The method of Claim 34 further comprising the steps of:

commanding a second printer to print the text pages constituting a book block for a second book to be printed where the size and the number of pages may vary widely from said first book within said limited range;

5        accumulating said text pages to form said book block for said second book;  
      upon transfer of said bound first book from said carriage to said trimming station,  
moving said carriage to a position for receiving said book block for said second book;

      positioning said second book block within said carriage in a known position;

      moving said carriage with said book block for said second book along said  
workpath to said adhesive application for having adhesive applied so as to be disposed  
between said spine and said cover of said second book upon binding;

      printing a cover for said second book in said cover printer;

      conveying said cover for said second book from said cover printer to said binding  
station and positioning said cover for said second book so as to be substantially in  
register with said spine of said book block for said second book when the latter is  
positioned at said binding station;

      moving said carriage to said binding station and stopping said carriage at said  
binding station with the spine of said book block for said second book substantially in  
register with said cover for said second book;

20        clamping said cover to said book block for said second book proximate said  
spine so as to adhesively bind said cover to said book block thereby forming a bound  
second book;

      moving said bound second book from said binding station to said trimming  
station and transferring said bound second book to said trimming station;

25           determining the amount of any excess margins along one or more edges of said  
bound second book; and

          effecting operation of a trimming blade at said trimming station so as to trim said  
excess margins from said bound second book thereby to form a second book of a  
predetermined finished size.

36.    A method of printing a plurality of text pages on a printer, accumulating  
said text pages to form a book block, and depositing said book block in a carriage, said  
printer being located above the level of said carriage, said pages being received in a  
tray, said method comprising the steps of:

- a.     discharging said pages from said printer;
- b.     accumulating said pages as they are discharged from said printer  
on a tray in a page receiving position; and
- c.     upon the completion of a predetermined number of pages, effecting  
movement of said tray from said receiving position to a discharge position in  
which said pages are discharged from said tray into said carriage.

37.    The method of Claim 36 further comprising the step of holding said pages  
to said tray after said predetermined number of pages have been accumulated on said  
tray and holding said pages relative to said tray as the latter is moved from its receiving  
to its discharge position, and then releasing said pages such that said pages are  
5   discharged by gravity into said carriage.

38.    The method of Claim 37 further comprising the step of jogging said pages  
as they are supported on said tray thereby to substantially align said pages comprising

said book block relative to one another.

39. The method of Claim 38 further employing a cover printer for printing a cover for the book to be bound, said cover having a center portion, said method further comprising positioning said cover relative to the book block at a binding station such that upon binding of said cover with said book block, the spine of said book block is  
5 substantially adhered to the center portion of said cover.

40. A method of manufacturing a plurality of print perfect bound books wherein each book manufactured may be, within a limited range, of a different size and have a widely varying number of pages, each book comprising a plurality of text pages constituting a book block and a paper cover of heavier stock than said text pages wrapped around the front, back and one edge of said book block, said one edge constituting a spine, said method comprising the steps of:

commanding a first text page printer to print the text pages constituting a book block for a first book to be printed;

accumulating said text pages to form said book block for said first book;

10 transferring said book block for said first book to a carriage;

moving said carriage along a work path, the later having an adhesive application station, a binding station, and a trimming station therealong;

at said adhesive application station, applying an adhesive to said spine of said book block;

15 printing a cover for said first book in a cover printer;

conveying said cover for said first book from said cover printer to said binding station and positioning said cover at said binding station so as to be substantially in

register with said spine of said first book block when the latter is positioned at said binding station;

20 moving said carriage to said binding station and stopping said carriage at said binding station with the spine of said book block for said first book substantially centered with respect to said cover;

clamping said cover to said book block for said first book proximate said spine so as to adhesively bind said cover to said book block thereby forming a bound first book;

25 moving said bound first book from said binding station to said trimming station and transferring said first bound book to said trimming station;

determining the amount of any excess margins along one or more edges of said bound book; and

30 effecting operation of a trimming blade at said trimming station so as to trim said excess margins from said first bound book thereby to form a first book of a predetermined finished size.

41. The method of Claim 40 further comprising the steps of;

commanding a second printer to print the text pages constituting a book block for a second book to be printed where the size and the number of pages of said second book may vary widely from said first;

5 fix formal accumulating said text pages to form said book block for said second book;

transferring said book block for said second book to said carriage;

moving said carriage to a position for receiving said book block for said second book;

10 moving said carriage with said book block for said second book along said  
workpath to said adhesive application for having adhesive applied to the spine of said  
book block;

printing a cover for said second book in said cover printer;

conveying said cover for said second book from said cover printer to said  
15 binding station and positioning said cover for said second book so as to be substantially  
in register with said spine of said book block for said second book when the latter is  
positioned at said binding station;

moving said carriage to said binding station and stopping said carriage at said  
binding station with the spine of said book block for said second book substantially  
20 centered with respect to said cover for said second book;

clamping said cover to said book block for said second book proximate said  
spine so as to adhesively bind said cover to said book block thereby forming a second  
bound book;

moving said second bound book from said binding station to said trimming  
25 station and transferring said second bound book to said trimming station;

determining the amount of any excess margins along one or more edges of said  
second bound book; and

effecting operation of a trimming blade at said trimming station so as to trim said  
excess margins from said second bound book thereby to form a second book of a  
30 predetermined finished size.